IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of:	)	
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Edward J. Dalgewicz III, et al.	)	Examiner: Robertson, Jeffrey
	)	
Serial No.: 10/055,172	)	Group Art Unit: 1712
	)	
Filed: January 25, 2002	)	Atty Dkt No. 004756.00018
	)	
For: THERMOPLASTIC COMPOSITIONS HAVING HIGH DIMENSIONAL STABILITY	)	

BRIEF ON APPEAL

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Pursuant to 37 C.F.R. § 1.192, Appellants submit this Appeal Brief, in triplicate, to the Board of Patent Appeals and Interferences in response to the Final Rejection mailed on December 19, 2003. A Notice of Appeal was timely filed on April 19, 2004. A petition for a one-month extension of time accompanies this submission.

(1) Real Party in Interest

The real party in interest is Associated Packaging Enterprises, Inc., the owner of the entire right, title and interest in and to the subject application.

(2) Related Appeals and Interferences

Appellants are unaware of any appeals or interferences related to the subject appeal.

(3) Status of the Claims

Claims 1-20, 23, 24, and 26, the subject of this appeal, stand finally rejected and are found in the Appendix. Claims 21, 22, and 25 stand withdrawn from consideration. No claim is allowed.

(4) Status of Amendments After Final Rejection

No amendment after final rejection has been filed.

(5) Summary of the Invention

The present invention is directed to a thermally crystallized polyester thermoplastic composition. The composition comprises a bulk polymer, an additive in a concentration from about 4 wt% to about 40 wt%, and a compatibilizer/emulsifier/surfactant (CES) in a concentration from about 0.1 wt% to about 8 wt%, based on the total weight of the composition. The bulk polymer is an alkylene terephthalate or naphthalate polyester selected from the group consisting of polyethylene terephthalate (PET), polyethylene naphthalate (PEN), polycycloterephthalate (PCT), polycycloterephthatlic acid (PCTA), (poly)ethylene-co-1,4-cyclohexane-dimethylene terephthalate (PETG), polytrimethylene terephthalate (PTT), and mixtures thereof. The additive is an amorphous or substantially amorphous co-polymer of ethylene and at least one acrylate, e.g., methylacrylate, butylacrylate, ethyl acrylate, and ethylhexyl methacrylate. The CES is a grafted or backbone co-polymer or ter-polymer of

ethylene and a glycidyl acrylate or maleic anhydride, and optionally methylacrylate, butylacrylate, ethyl acrylate, ethylhexyl methacrylate, or mixtures thereof (specification ¶ **[18]**).

Preferred thermoplastic compositions of the invention exhibit properties especially desirable in food-grade applications. One desirable property is a relatively low to medium I.V. of PET, which improves extrusion and molding of a heat-set product with improved toughness. Other desirable properties include high dimensional stability, high temperature resistance, toughness, processibility, and improved molding detail. The composition is thermally stable, resulting in low extractives and less degradation, ensuring food-grade compliance. Together these properties render the thermoplastic composition especially suitable for use in articles such as dual-ovenable containers, which require high dimensional stability and sealability for high-speed packaging and distribution of frozen or refrigerated food products. The ability to use lower I.V. polyesters also permits more economical production of heat-set products having high dimensional stability and resistance to degradation over broad temperature ranges (specification ¶ **[27]**).

Thermal crystallinity is an important property to provide excellent dimensional stability at elevated temperatures. Thermal crystallinity is achieved by heating a polymer for a sufficient time at a temperature above the polymer's glass transition temperature (T_g). The glass transition temperature for PET is about 70°C. The crystallization temperature can be visually observed as the point at which a substantially amorphous, non-oriented sheet of polymer changes from a translucent, hazy appearance to a white appearance. The thermoplastic compositions of the appealed claims have a level of thermally induced crystallinity of at least about 15%. Such

minimum levels are particularly suitable for food containers of high dimensional stability and impact resistance for use in high temperature food applications (specification, ¶¶ 56-59).

(6) Issues

The issues under appeal are (1) whether the subject matter of claims 1-19, 23, and 24 is anticipated by or would have been obvious over EP 838,501 ("EP '501"); (2) whether the subject matter of claims 1-19, 23, and 24 would have been obvious over EP '501 in view of Brydson, *Plastic Materials* at page 590 ("Brydson"); and (3) whether the subject matter of claims 1-20, 23, 24 and 26 would have been obvious over JP 1,247,454 ("JP '454") in view of Brydson.

(7) Grouping of Claims

The rejected claims stand or fall together.

(8) Argument

I. EP '501 Does Not Describe or Suggest a Thermally Crystallized Composition as Claimed in Independent Claims 1, 20, and 26

EP '501 discloses a modified polyester composition that is said to have improved impact resistance. The modifier includes an ethylene acrylate co-polymer or an ethylene alkyl methacrylate co-polymer, and a ter-polymer selected from ethylene/alkyl acrylate/glycidyl methacrylate; ethylene/alkyl acrylate/glycidyl acrylate; ethylene/alkyl methacrylate/glycidyl acrylate; and ethylene/alkyl methacrylate/glycidyl methacrylate (page 2, lines 39-44). The compositions are said to be useful in automobile panels, automobile parts, industrial plumbing,

and construction parts (page 6, lines 4-5). The composition is extruded and pelletized, and parts are formed by injection molding the pelletized extrudate (page 6, lines 33-34).

The Final Office Action incorrectly asserts that the injection molded compositions described in EP '501 would have 15% or more thermal crystallinity, at least when nucleating agents are used. In EP '501, compositions are formed by injection molding at temperatures well below the polymers' glass transition temperature so that virtually no thermal crystallinity is present, *i.e.*, the molded compositions are virtually amorphous. This fact was demonstrated by experiments reported in the November 18, 2002 Patel declaration (of record). Mr. Patel declared that "compositions were prepared essentially as set forth in the last two entries of Table 2 (page 8) of EP '501." (Patel Dec. ¶ 3). Mr. Patel reported that these injection molded samples were "virtually amorphous." (Patel Dec. ¶7). There is no basis for the Final Office Action to conclude that the compositions in Table 2 of EP '501 would have thermal crystallinity, particularly given that the record evidence clearly shows otherwise.

EP '501 does not describe a composition which maintains dimensional stability during extended periods at 250°F, as set forth in independent claim 1. The Final Office Action points out that EP '501 describes heat deflection temperatures as high as 225°C. However, the Patel declaration demonstrates that the heat deflection temperatures reported in EP '501 are not reproducible. As reported in the Patel declaration, the cited EP '501 compositions exhibited shrinkage at 212°F in the absence of reinforcing fillers (Patel Dec. ¶9). The compositions exhibited heat distortion at temperatures of 250-400°F, e.g., temperatures typically encountered in cooking applications, even when reinforcing fillers were used (Patel Dec. ¶10). Accordingly,

the present record demonstrates that EP '501 neither discloses nor suggests the composition of independent claims 1, 20, or 26.

Faced with this record evidence that the heat deflection data reported in EP '501 are not reproducible, the Advisory Action of April 12, 2004 argues, "it is clear that the compositions contain conventional additives and that conventional additives include nucleating agents. One of ordinary skill in the art would know that in order to obtain the high heat deflection temperature shown in Table 2 that high levels of crystallization are needed and that nucleating agents are the conventional additives used to obtain high crystallization in PET."

This statement in the Advisory Action effectively concedes that EP '501 is facially defective with respect to achieving the reported heat deflection temperatures. <u>EP '501 says nothing about crystallinity.</u> Although EP '501 mentions nucleating agents, nowhere does the document suggest that nucleating agents (or crystallinity) are necessary to obtain the reported heat deflection temperatures. If crystallinity is <u>critical</u> to achieving the reported heat deflection temperatures, EP '501 is non-enabling with respect to obtaining the reported heat deflection temperatures. It is implausible to conclude that persons skilled in the art would have understood the need for crystallinity by a mere reference to "conventional additives," as the Advisory Action urges. To the contrary, a reference to "conventional additives" would be understood as meaning that such additives are <u>not</u> critical to obtaining the desired heat deflection properties.

More significantly, EP '501 does not discuss or suggest inducing <u>thermal</u> crystallinity to the compositions. Even assuming, *arguendo*, that persons skilled in the art would have understood an unstated need for nucleating agents, nothing in EP '501 suggests annealing or other treatments that would impart <u>thermal</u> crystallinity to the compositions, as is required by

independent claims 1, 20, and 26. There simply is no guidance, teaching, or suggestion that would have led persons of ordinary skill to employ thermal treatments that would be needed to induce thermal crystallinity in the disclosed compositions.

The USPTO bears the burden of citing objective evidence to support all underlying questions of fact in a prior art rejection. *In re Kotzab*, 217 F.3d 1365, 55 U.S.P.Q.2d 1313 (Fed. Cir. 2000); *In re Lee*, 277 F.3d 1338, 61 U.S.P.Q.2d 1430 (Fed. Cir. 2000) ("the [USPTO's] findings must extend to all material facts and must be documented on the record, less the 'haze of so-called expertise' acquire insulation from accountability."). The Final Office Action's reliance on the mere mention of "conventional additives" in EP '501 as somehow instructing the skilled worker to (1) the need for nucleating agents and (2) the need for levels of thermal crystallinity of at least about 15%, finds no support in the record whatever. Such unsupported assertions relating to material questions of fact are legally insufficient. The prior art rejections based on these unsupported assertions should be reversed.

II. Even if the EP '501 Compositions Were Modified to Include Nucleating Agents, the Final Office Action Not Shown That the Resulting Compositions Would Have Levels of Thermal Crystallinity of At Least About 15%

The Advisory Action cites Akagi U.S. Patent 4,344,874 and Wainer U.S. Patent 4,000,229, in addition to Brydson cited in the Final Office Action, as evidence of the conventional use of nucleating agents to allegedly obtain high levels of thermal crystallinity in injection-molded PET. However, none of these documents supports the Advisory Action's assertion.

Akagi describes polyethylene terephthalate resin compositions said to be capable of providing a molded article of high crystallinity and dimensional stability. It is evident from Akagi, however, that any crystallinity resulting from injection-molding polyethylene terephthalate is not thermal crystallinity. For example, Akagi discusses efforts to accelerate crystal formation in polyethylene terephthalate resins and states that "molded article[s] obtained in a partially crystalline state" can be deformed during post-heat treatments aimed at increasing crystallinity levels (column 1, lines 31-39). Akagi seeks to improve dimensional stability so that the compositions can withstand these post-heat (annealing) treatments. In contrast, articles which are molded at a time and temperature sufficient to induce levels of thermal crystallinity of at least about 15%, as described and claimed in the subject application, exhibit dimensional stability at elevated temperatures without the need for annealing.

Wainer describes a nucleating agent which is oriented by external magnetic forces to catalyze crystal growth in polyethylene terephthalate in a controlled direction (column 1, lines 42-56). The Advisory Action refers to Table 4 in Wainer as allegedly showing that levels of thermal crystallinity in injection molded PET of at least about 15% are "low" levels. Each of the PET compositions in Table 4 has a starting crystallinity of 15% or 37%. It is evident from Wainer that the PET compositions in Table 4 were subjected to a thermal treatment. Wainer states at column 22, lines 31-40 that PET which is not subjected to post-condensation heat treatment "is essentially amorphous ... and will generally show a crystallinity of less than 5 percent." The starting crystallinity levels of 15% or 37% in Table 4 clearly reflect the thermal treatment which precedes the examples (note corresponding "starting" crystallinity levels in

Table 3). Wainer thus contradicts the Advisory Action's position that nucleating agents alone impart thermal crystallinity to injection-molded PET.

The documents cited in the Advisory Action actually rebut the Final Office Action's assertion that adding a nucleating agent to the EP '501 compositions would result in injection molded compositions having at least about 15% thermal crystallinity. Akagi and Wainer instead demonstrate the need for thermal treatments to impart crystallinity to polyethylene terephthalate compositions. Thus, even if EP '501 were combined with Brydson, Akagi, and/or Wainer to employ nucleating agents as proposed in the Final Office Action, the claimed invention would not result. None of these documents, whether taken alone or in any combination, describes or suggests the particularly claimed thermally crystallized polymeric composition. Dependent claims 2-19 and 21-25 are allowable for at least the same reasons that the respective independent claims from which they depend are allowable. Reversal of the §§ 102 and 103 rejections over EP '501 and Brydson is respectfully requested.

III. JP '454 Does Not Describe a Thermally Crystallized Composition as Set Forth in Independent Claims 1, 20, and 26

JP '454 is cited as describing modified aromatic polyester resin compositions useful in automotive parts and electrical and electronic machine parts. Such parts are prepared by injection molding pellets prepared from the disclosed compositions (see Application Examples 1-9). All of the examples in JP '454 disclose compositions of polybutylene terephthalate (PBT), whereas independent claims 1, 20, or 26 specify a bulk polymer selected from PET, PEN, PETG,

PCT, PCTA, PTT, and mixtures thereof. The Advisory Action asserts that the JP '454 specification discloses polyethylene terephthalate as a preferred aromatic polyester resin.

The Final Office Action apparently recognizes that JP '454 does not describe a composition having a level of thermal crystallinity of at least about 15%. Brydson is cited as disclosing the use of nucleating agents in injection-molded PET compositions. The Final Office Action asserts that the injection-molded PET compositions suggested in JP '454 when containing nucleating agents, as disclosed in Brydson, would inherently have levels of thermal crystallinity of at least about 15%, as set forth in independent claims 1, 20, and 26. Appellants respectfully disagree.

As discussed above with reference to the Akagi and Wainer documents cited in the Advisory Action, nucleating agents alone do not impart thermal crystallinity to injection molded PET compositions. This is evident from the need for thermal treatments to impart crystallinity – even when nucleating agents are used – as disclosed in Akagi and Wainer themselves. Such thermal treatments are nowhere taught, suggested, or even hinted at in JP '454, nor does the Final Office Action even seem to allege so.

JP '454, whether taken alone or in combination with Brydson, fails to disclose or suggest the <u>thermally crystallized</u> polymeric composition claimed in independent claims 1, 20, and 26. Dependent claims 2-19 and 21-25 are allowable over these documents for at least the same reasons that the independent claims from which they depend are allowable. Reversal of the § 103 rejection over JP '454 in view of Brydson is respectfully requested.

Conclusion

None of the prior art of record, whether taken alone or in any combination, describes or suggests the thermally crystallized thermoplastic composition as set forth in the appealed claims. Reversal of the rejections under 35 U.S.C. §§ 102 and 103 is respectfully requested.

Respectfully submitted,

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APPENDIX

1. A thermally crystallized thermoplastic polymeric composition having a degree of thermally induced crystallinity of at least about 15%, said composition comprising:

a bulk polymer selected from the group consisting of PET, PEN, PETG, PCT, PCTA, PTT, and mixtures thereof, said bulk polymer optionally comprising up to about 10 wt% of a polyethylene based on the total weight of the bulk polymer;

an additive in a concentration from about 4 wt% to about 40 wt%, based on a total weight of the composition, comprising a substantially amorphous co-polymer of ethylene and an acrylate; and

a compatibilizer/emulsifier/surfactant (CES) in a concentration from about 0.1 wt% to about 8 wt%, based on the total weight of the composition, comprising a grafted or backbone co-polymer or ter-polymer of ethylene and a glycidyl acrylate or maleic anhydride, and optionally an acrylate selected from the group consisting of methylacrylate, ethylacrylate, propylacrylate, butylacrylate, ethylhexylacrylate, and mixtures thereof;

wherein said composition maintains dimensional stability during extended periods at 250°F.

2. The thermoplastic polymeric composition of claim 1 wherein said bulk polymer comprises one or more linear or branched homo-polymers, co-polymers, recycled polyesters, or a mixture thereof.

3. The thermoplastic polymeric composition of claim 1 wherein said additive is selected from the group consisting of ethylene/methylacrylate co-polymer, ethylene/butylacrylate co-polymer, ethylene/ethylacrylate co-polymer, ethylene/ ethylhexylacrylate co-polymer, and mixtures thereof, and optionally contains a core-shell toughener.

4. The thermoplastic polymeric composition of claim 3 wherein said additive co-polymer comprises from about 7 wt% to about 40 wt% of said acrylate, based on a total weight of said co-polymer.

5. The thermoplastic polymeric composition of claim 4 wherein said additive co-polymer comprises from about 17 wt% to about 35 wt% of said acrylate, based on the total weight of said co-polymer.

6. The thermoplastic polymeric composition of claim 1 wherein the concentration of said additive is from about 4 wt% to about 30 wt%, based on the total weight of the composition.

7. The thermoplastic polymeric composition of claim 6 wherein the concentration of said additive is from about 6 wt% to about 15 wt%.

8. The thermoplastic polymeric composition of claim 1 wherein said CES is selected from the group consisting of ethylene/glycidyl methacrylate co-polymer, ethylene/maleic anhydride co-polymer, ethylene/glycidyl methacrylate/methylacrylate ter-polymer, ethylene/ glycidyl

methacrylate/ethylacrylate ter-polymer, ethylene/glycidyl methacrylate/butylacrylate ter-polymer, ethylene/glycidyl methacrylate/ethylhexyl acrylate ter-polymer, ethylene/maleic anhydride/methylacrylate ter-polymer, ethylene/maleic anhydride/ethylacrylate ter-polymer, ethylene/maleic anhydride/ butylacrylate ter-polymer, ethylene/maleic anhydride/ethylhexyl acrylate ter-polymer, and mixtures thereof.

9. The thermoplastic polymeric composition of claim 8 wherein said CES concentration is from about 0.2 wt% to about 6 wt%, based on the total weight of the composition.

10. The thermoplastic polymeric composition of claim 1 wherein said CES comprises a co-polymer or ter-polymer having from 0 to about 40 wt% of said acrylate and from about 0.1 to about 12 wt% of said glycidyl acrylate or maleic anhydride, based on a total weight of the co-polymer or ter-polymer.

11. The thermoplastic polymeric composition of claim 10 wherein said CES comprises a ter-polymer having from about 10 wt% to about 30 wt% of said acrylate.

12. The thermoplastic polymeric composition of claim 10 wherein said CES co-polymer or ter-polymer has from about 1 wt% to about 10 wt% of said glycidyl acrylate or maleic anhydride.

13. The thermoplastic polymeric composition of claim 1 wherein said bulk polymer comprises a blend of virgin and recycled polyesters.

14. The thermoplastic polymeric composition of claim 1 wherein said bulk polymer comprises a blend of at least two polyesters having different intrinsic viscosities.

15. The thermoplastic polymeric composition of claim 1 wherein said bulk polymer comprises at least one polyester having an intrinsic viscosity of less than about 0.95.

16. The thermoplastic polymeric composition of claim 15 wherein said intrinsic viscosity is less than about 0.90.

17. The thermoplastic polymeric composition of claim 16 wherein said intrinsic viscosity is less than about 0.85.

18. The thermoplastic polymeric composition of claim 17 wherein said intrinsic viscosity is less than about 0.80.

19. The thermoplastic polymeric composition of claim 18 wherein said intrinsic viscosity is about 0.5.

20. A food-grade thermoplastic polymeric composition having a degree of thermally induced crystallinity of at least about 15%, said composition comprising:

a bulk polymer selected from the group consisting of PET, PEN, PETG, PCT, PCTA, PTT, and mixtures thereof, said bulk polymer optionally comprising up to about 10 wt% of a polyethylene based on the total weight of the bulk polymer;

an additive in a concentration from about 4 wt% to about 15 wt%, based on a total weight of the composition, comprising a substantially amorphous co-polymer of ethylene and an acrylate; and

a compatibilizer/emulsifier/surfactant (CES) in a concentration from about 0.1 wt% to less than 4 wt%, based on the total weight of the composition, comprising a grafted or backbone co-polymer or ter-polymer of ethylene and a glycidyl acrylate or maleic anhydride, and optionally an acrylate selected from the group consisting of methylacrylate, ethylacrylate, propylacrylate, butylacrylate, ethylhexylacrylate, and mixtures thereof;

wherein said composition maintains dimensional stability during extended periods at 250°F.

23. The thermoplastic composition of claim 1 which has a degree of thermally induced crystallinity of at least about 20%.

24. The thermoplastic composition of claim 20 which has a degree of thermally induced crystallinity of at least about 20%.

26. A food-grade thermoplastic polymeric composition having a degree of thermally induced crystallinity of at least about 15%, said composition comprising:

a bulk polymer selected from the group consisting of PET, PEN, PETG, PCT, PCTA, PTT, and mixtures thereof;

an additive in a concentration from about 4 wt% to about 15 wt%, based on a total weight of the composition, comprising a substantially amorphous co-polymer of ethylene and an acrylate; and

a compatibilizer/emulsifier/surfactant (CES) in a concentration from about 0.1 wt% to less than 4 wt%, based on the total weight of the composition, comprising a grafted or backbone co-polymer or ter-polymer of ethylene and a glycidyl acrylate or maleic anhydride, and optionally an acrylate selected from the group consisting of methylacrylate, ethylacrylate, propylacrylate, butylacrylate, ethylhexylacrylate, and mixtures thereof;

wherein said composition maintains dimensional stability during extended periods at 212°F in the absence of reinforcing fillers.